

WHAT IS CLAIMED IS:

1. A semiconductor light emitting element comprising:
a transparent first conduction type substrate having a first surface and a second surface opposed to each other and being transparent to light of a wavelength λ ;

a semiconductor epitaxial layer formed on a location of the first surface of the substrate directly or via a buffer layer, and including a semiconductor layer of a first conduction type formed in electrical connection with the substrate, an active layer formed on the semiconductor layer of the first conduction type to emit light of the wavelength λ and a semiconductor layer of a second conduction type formed on the active layer;

a first electrode formed in electrical connection with the semiconductor layer of the second conduction type of the semiconductor epitaxial layer on a location of a surface of the semiconductor epitaxial layer opposite from the substrate;

a second electrode formed in electrical connection with the substrate on a location of the second surface of the substrate offset from alignment with the first electrode;
and

a groove formed to indent from the second surface of the substrate toward the first surface thereof in a location between the first electrode and the second electrode.

2. A semiconductor light emitting element according to claim 1 wherein the groove has a pass-through surface portion permitting the light from the active layer to pass through externally of the substrate and a reflective surface portion for reflecting light passing through the pass-through surface portion.

3. A semiconductor light emitting element according to claim 1 wherein the groove is wedge-shaped.

4. A semiconductor light emitting element according to claim 1 wherein side surfaces of the semiconductor epitaxial layer are covered with an insulating material.

5. A semiconductor light emitting element according to claim 1 wherein an insulating film is formed on side surfaces of the semiconductor epitaxial layer, a part of the surface of the semiconductor epitaxial layer opposite from the substrate excluding the surface covered with the first electrode, and the first surface of the substrate or the buffer layer.

6. A semiconductor light emitting element according to claim 5 wherein the insulating film is made of a material transparent to light of the wavelength λ from the active layer, and wherein the insulating film is adjusted in thickness to be odd number times of $\lambda/4n$ where n is the refractive index of the insulating film.

7. A semiconductor light emitting element according to claim 1 wherein the semiconductor epitaxial layer is formed on a location of the first surface of the substrate via the buffer layer.

8. A semiconductor light emitting element according to claim 1 wherein the semiconductor layer of the first conduction type, the active layer and the semiconductor layer of the second conduction type included in the semiconductor epitaxial layer are made of InGaAlP compound semiconductor.

9. A semiconductor light emitting element according to claim 1 wherein the substrate is a GaP substrate.

10. A semiconductor light emitting device comprising:
a semiconductor light emitting element having:
a transparent first conduction type substrate

having a first surface and a second surface opposed to each other and being transparent to light of a wavelength λ ;

a semiconductor epitaxial layer formed on a location of the first surface of the substrate directly or via a buffer layer, and including a semiconductor layer of a first conduction type formed in electrical connection with the substrate, an active layer formed on the semiconductor layer of the first conduction type to emit light of the wavelength λ and a semiconductor layer of a second conduction type formed on the active layer;

a first electrode formed in electrical connection with the semiconductor layer of the second conduction type of the semiconductor epitaxial layer on a location of a surface of the semiconductor epitaxial layer opposite from the substrate;

a second electrode formed in electrical connection with the substrate on a location of the second surface of the substrate offset from alignment with the first electrode; and

a groove formed to indent from the second surface of the substrate toward the first surface thereof in a location between the first electrode and the second electrode;

a reflector; and

an electrically conductive mounting material for mounting the first electrode of the semiconductor light emitting element on the reflector.

11. A semiconductor light emitting device according to claim 10 wherein the groove has a pass-through surface portion permitting the light from the active layer to pass through externally of the substrate and a reflective surface portion for reflecting light passing through the pass-through surface portion.

12. A semiconductor light emitting device according to claim 10 wherein the groove is wedge-shaped.

13. A semiconductor light emitting device according to claim 10 wherein side surfaces of the semiconductor epitaxial layer are covered with an insulating material.

14. A semiconductor light emitting device according to claim 10 wherein an insulating film is formed on side surfaces of the semiconductor epitaxial layer, a part of the surface of the semiconductor epitaxial layer opposite from the substrate excluding the surface covered with the first electrode, and the first surface of the substrate or the buffer layer.

15. A semiconductor light emitting device according to claim 14 wherein the insulating film is made of a material translucent to light of the wavelength λ from the active layer, and wherein the insulating film is adjusted in thickness to be odd number times of $\lambda/4n$ where n is the refractive index of the insulating film.

16. A semiconductor light emitting device according to claim 10 wherein the semiconductor epitaxial layer further includes a reflective layer of the second conduction type on the semiconductor layer of the second conduction type to reflect light of the wavelength λ .

17. A semiconductor light emitting device according to claim 10 wherein the semiconductor layer of the first conduction type, the active layer and the semiconductor layer of the second conduction type included in the semiconductor epitaxial layer are made of InGaAlP compound semiconductor, and wherein the substrate is a GaP substrate.

18. A semiconductor light emitting device comprising:
a semiconductor light emitting element having:

a GaP substrate of a first conduction type, having a first surface and a second surface opposed to each other and being translucent to light of a wavelength λ ;

a semiconductor epitaxial layer formed on a location of the first surface of the substrate via a buffer layer of a GaP compound semiconductor, and including a semiconductor layer of a first conduction type formed in electrical connection with the GaP substrate, an active layer formed on the semiconductor layer of the first conduction type to emit light of the wavelength λ , a semiconductor layer of a second conduction type formed on the active layer, a reflective layer of the second conduction type formed on the semiconductor layer of the second conduction type to reflect light of the wavelength λ , and a contact layer of the second conduction type formed on the reflective layer, the semiconductor layer of the first conduction type, the active layer and the semiconductor layer of the second conduction type being made of InGaAlP compound semiconductor and being different in lattice constant and material from the GaP substrate, the contact layer of the second conduction type being made of a GaAs compound semiconductor;

a first electrode formed on a location of the contact layer of the second conduction type in electrical connection therewith;

a second electrode formed on a location of the second surface of the substrate in electrical connection therewith; and

a wedge-shaped groove formed to indent from the second surface of the substrate toward the first surface thereof in a location between the first electrode and the second electrode, and having a pass-through surface

portion permitting the light from the active layer to pass through externally of the substrate and a reflective surface portion for reflecting light passing through the pass-through surface portion;

a reflector; and

an electrically conductive mounting material for mounting the first electrode of the semiconductor light emitting element on the reflector.